THE MODULATORY EFFECT OF VASOPRESSIN ON CIRCADIAN RHYTHMS OF ACTIVITY AND BODY TEMPERATURE IN AD-LIBITUM AND FOOD-RESTRICTED CONDITIONS.

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Male, vasopressin-containing, Long-Evans (LE) and vasopressin-deficient, Brattleboro (DI) rats were maintained in individual cages while telemetered activity and core body temperature data were collected. The rats were exposed to a 12:12 light-dark cycle with a room temperature of 23±1°C and allowed to habituate for 14 days with ad-libitum access to food and water. The habituation period was followed by an experimental period in which a stress of 23h of food restriction per day was introduced. A 1h feeding period was initiated 1h after the beginning of the light cycle.

The circadian rhythm of activity was similar in DI and LE animals during the habituation period except that the second peak of activity in the dark period occurred 1 to 2 hours earlier in DI rats than in LE rats. There were, however, significant differences between the means of the two groups during both the light and dark periods on all of the days with the DI animals being significantly more active than the LE animals. During the experimental period, marked differences were found between the DI and LE animals with respect to activity. DI animals were significantly more active than LE animals throughout the food-restricted condition during both light and dark time periods. As the experiment progressed, the DI cycle shifted to adjust to the presentation of food. That is, they were more active in the light period than in the dark period. LE animals, on the other hand, showed a significant attenuation of activity, particularly in the dark period.

The circadian rhythm of body temperature was similar in DI and LE animals during the habituation period except that the first peak of body temperature in the dark period occurred 1 to 2 hours later in DI rats than in LE rats. Temperatures were lower during the light phase than during the dark phase for both DI and LE animals. Body temperature was significantly lower in DI rats than in LE rats during the dark period on all days of the habituation period. During the experimental period, marked differences were found between the DI and LE animals with respect to body temperature. During the light period, DI animals actually attained a higher peak temperature than LE animals. During the dark period, DI animals had a significantly lower body temperature than LE animals. As the stress of food restriction continued, the minimum body temperature decreased by more than 0.5°C per day for the DI animals. As the experiment progressed, both the DI and LE cycles shifted to adjust to the presentation of food. That is, the temperature was higher in the light period than in the dark period.

Upon examination of data obtained during the habituation period, it appears that vasopressin plays a modulatory role in circadian rhythms of activity and body temperature since DI rats show differences in these two variables when compared to their LE counterparts. The stress of food restriction, however, is more deleterious to vasopressin-deficient rats than to vasopressin-containing rats as evidenced by the fact that DI rats are significantly more active than LE rats and DI rats show serious impairment in the regulation of their body temperature which leads to the demise of these animals.